REGULATING STREAMFLOW FROM SMALL WATERSHEDS

Forest Lands in the South often make up more than half of the small upstream watershed areas. Thus, whether or not there are clear streams and regulated streamflow is determined in large measure by what happens on these timberlands. Expanding research programs are providing us with valuable information for sound watershed planning and action programs.

In the South, as elsewhere, it is being more widely recognized that land treatment measures to stabilize stream flow, reduce flooding, and lessen soil erosion should be integral parts of any flood control program. Generally, in developing comprehensive watershed programs it should be planned to initiate remedial measures in the headwater areas first. Unless the need for major engineer-

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ing works such as large dams, levees, and diversion ditches is immediate, the treatment of upstream problems first often allows for a modification of structure design to handle reduced flood peaks and lesser amounts of dam filling sediment. Also, floodwater and sediment damage to land and crops in the small upstream floodplains is usually much greater over a period of years than that which is sustained along the rivers and major tributaries.

Because forest lands in the South often make up more than half of the small up-

FOREST FARMER
Good forest practices are playing an increasingly vital role on the small upstream watersheds stream watershed areas, how we treat these lands will determine whether or not we will have clear streams and regulated streamflow. For more than 20 years the U. S. Forest Service's 5,600-acre Coweeta Hydrologic Laboratory in western North Carolina has provided valuable research data concerning watershed management on small forested and cleared watersheds under a wide range of land use practices. Other public agencies have conducted studies along the same line and have furnished additional valuable research findings. These findings are providing a sound basis for watershed planning and action programs.

Results of some of the studies are noteworthy. It was found in one instance that rainfall could be absorbed into a porous forest soil 17 times faster than an adjacent trampled pasture. Maximum flood flows were 25 times greater from the pasture than from the undisturbed forest. Flood and silt damages caused by typical logging practices in the Southern Appalachians and Piedmont showed up in another experiment. During logging operations water turbidity rose to 5,700 parts of silt per million parts of water (ppm) as against 80 ppm from an adjacent unlogged check area. The logging roads in the mountain area lost two inches of soil from the surface annually. Extreme floodwater and sediment damages were also highlighted in tests to determine the effect of severe forest fires and failure to treat and stabilize eroded and gullied areas.

The forest land manager can make use of much of this research data and thereby do his share to bring about good watershed conditions. Watershed management is usually so closely associated with proper land use and conservation that the condition of our forest soils will generally improve through application of proper timber management and protection techniques. It should be realized that for certain areas specific practices might be used that should not be considered elsewhere. For example, in the lower coastal plain area of the South the terrain is usually flat and the soils so sandy and deep that surface runoff and sedimentation problems rarely exist. Here, prescribed burning might be employed or woodland grazing permitted.

Fire protection, however, is generally the key forestry measure for a sound watershed program. By destroying protective ground cover, burning sets the stage for erosion and sedimentation damages. This leads to a reduced supply of clear and usable water. Normally, a burned-over forest will develop a new forest floor in a few years but it will take several decades to return to its pre-burned condition.

Planting of trees on sheet eroding or gullied lands is another important measure for reducing water turbidity. Successful plantings will largely halt soil movement and will substantially increase the infiltration capacity of soils in areas that are prime sources of damaging sediment and storm runoff.

Care should be taken in harvesting forest crops to see that logging roads and skid trails are properly located, constructed, drained, and maintained. This will help insure that accelerated runoff and erosion will not occur.

Although controlled grazing can often be practiced on forest lands without appreciable watershed damage, uncontrolled or severe grazing can be very harmful. In the early stages trampling damage to a watershed may easily be overlooked. It is the accumulative effects which first become conspicuous and which remain for a long time, even though grazing may subsequently be excluded for many years.

Great impetus was given to small watershed improvement when the 83rd Congress enacted the Watershed Protection and Flood Prevention Act of 1954 (Public Law 566). This act provides legislative authority, and for the first time makes federal funds available on a large scale for solving water management and flood control problems of small catchment areas. The Soil Conservation Service is responsible for the over-all administration of the act. The Forest Service is responsible for the technical adequacy of the forestry plans, recommendations, and action programs.

To receive help under this act a local watershed association or other recognized legal organization must sponsor an application for assistance and then assume certain responsibilities in connection with the action program once a watershed plan is approved and authorized.

Federal help under this act will be mainly for accelerating current conservation programs and for installing certain measures which the local people cannot accomplish through available facilities. To qualify for federal cost-sharing a measure must give appreciable flood or sediment damage reduction benefits and be justified economically. In addition to financial assistance to help stabilize critical silt source areas and to protect watershed values, federal funds will be available for construction of such engineering works as floodwater retarding structures and stream channel rectification.

All federal forestry assistance will follow, as closely as possible, the framework of existing cooperative federal-state programs. The state foresters will on a predetermined cost-sharing basis involving local, state, and federal commitments normally assume the responsibility for furnishing technical on-the-ground woodland management assistance to landowners.

This program of watershed protection and flood prevention has received wide-spread publicity among agricultural agencies. One hundred and fifty preliminary watershed examinations have been made as of this writing, the greatest number—41—in Georgia. Watersheds approved for detailed planning total 57, with Forest Service planning completed on 23. Programs approved for action number 13.

Our rapidly increasing population and the greatly expanded per capita consumption of water make it imperative that we give thought to the future. The Watershed Protection and Flood Prevention Act should give added impetus to the Conservation activities of local organizations. Results from these cooperative watershed programs may well set the pattern for the future.

The Coweeta Hydrologic Laboratory in western North Carolina is providing valuable research data on watershed management on small forested areas. For the full story, turn to page 20.
To find out just how much water a forest drinks, trees and shrubs were cut on this slope, but left where they fell so as not to disturb soil or protective ground cover. First year after cutting, streamflow increased 65 percent, and a 100 percent gain was noted in late summer when rainfall normally is at a minimum.

Forests can be managed for water supplies as well as for timber, and western North Carolina has the pilot plant for demonstrating this—the Coweeta Hydrologic Laboratory located in the high Nantahala country in Macon County, near Franklin.

About 50 years ago after some devastating floods occurred in the Southern Appalachians, a Congressional Committee studied the situation and decided the sensible way to regulate streamflow and protect valley lands was to put the mountain forests under management. A little later, in 1911, the Weeks Law authorized establishment of the first national forests in North Carolina and other eastern states to protect the headwaters of navigable waters.

The weir above has written a story of mountain farming. For several years streamflow was measured under natural conditions. Then the area was cleared, plowed and grazed in the same way mountain people farm such hillside in the Appalachians. Below, a view of the fenced pasture, which didn’t pay. In a few years the cattle had a hard time finding enough to eat.

The first plowing on the Coweeta Station’s mountain farm. The corn crop became progressively poorer until, after seven years, there wasn’t enough corn to pay for the cost of seed.
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OUR COVER: The plates which produce the strikingly beautiful cover of this issue were originally used on the cover of “The Log”, the magazine of the Champion Paper and Fibre Company. Forest Farmer is indebted to Champion for their use.